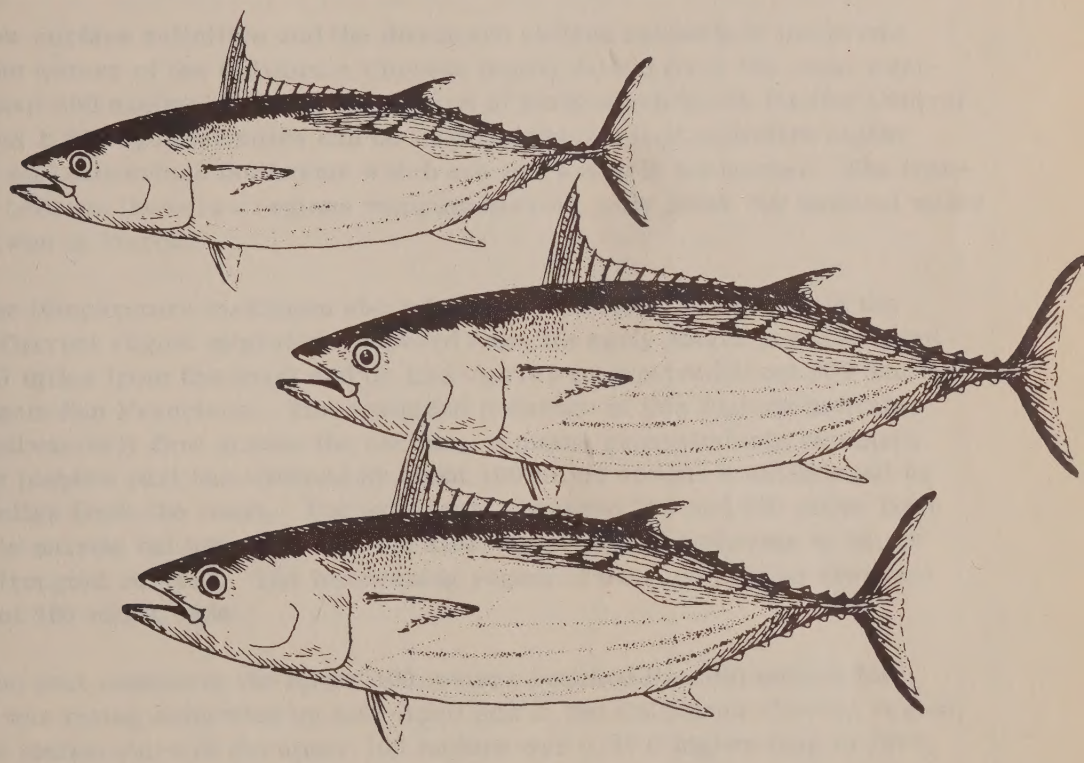
APRIL-1972,-No.-4

FISHING INFORMATION

UNITED STATES DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION



Contents

	Page
Vertical Sections of Subsurface Temperature in the Northeast Pacific Ocean	1
Narrative Description of Ocean Temperature Conditions	2
Sea Surface Temperature Charts, Pacific Ocean April 1972	4

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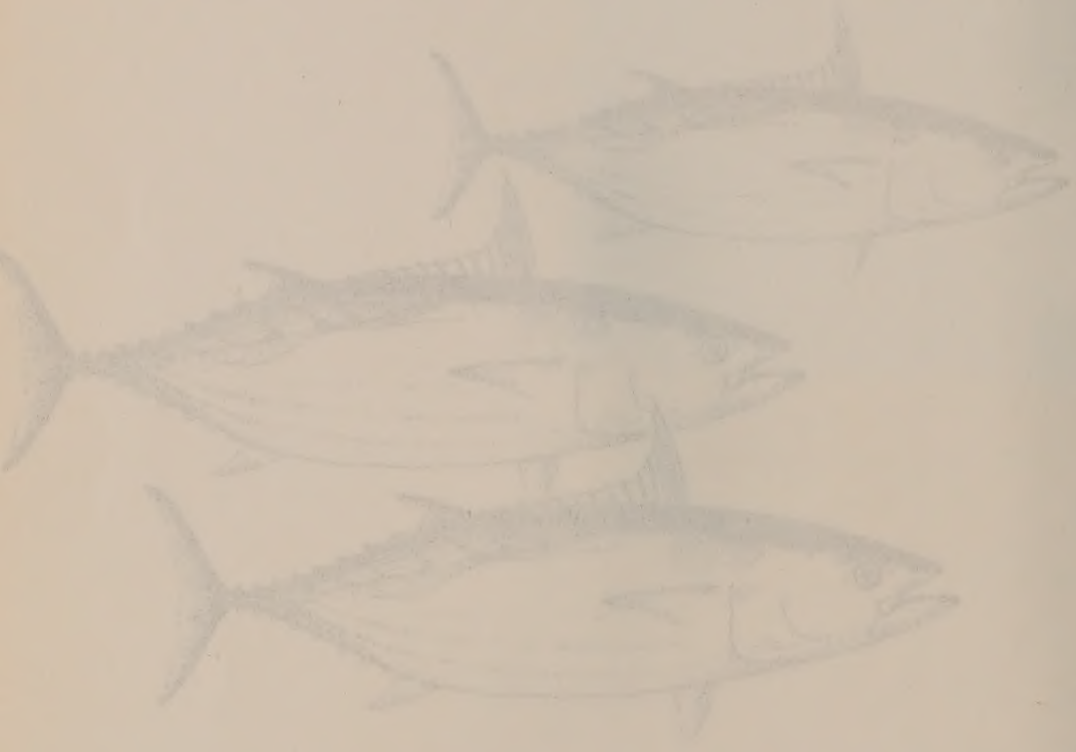


VERTICAL SECTIONS OF SUBSURFACE TEMPERATURE IN THE NORTHEAST PACIFIC OCEAN

Subsurface temperature sections between San Francisco and Honolulu (see track on figure 3) for the periods April 2-5 and April 15-19, 1972, are shown in Plates 1 and 2, respectively. The major features remain little changed from the March sections published last month.

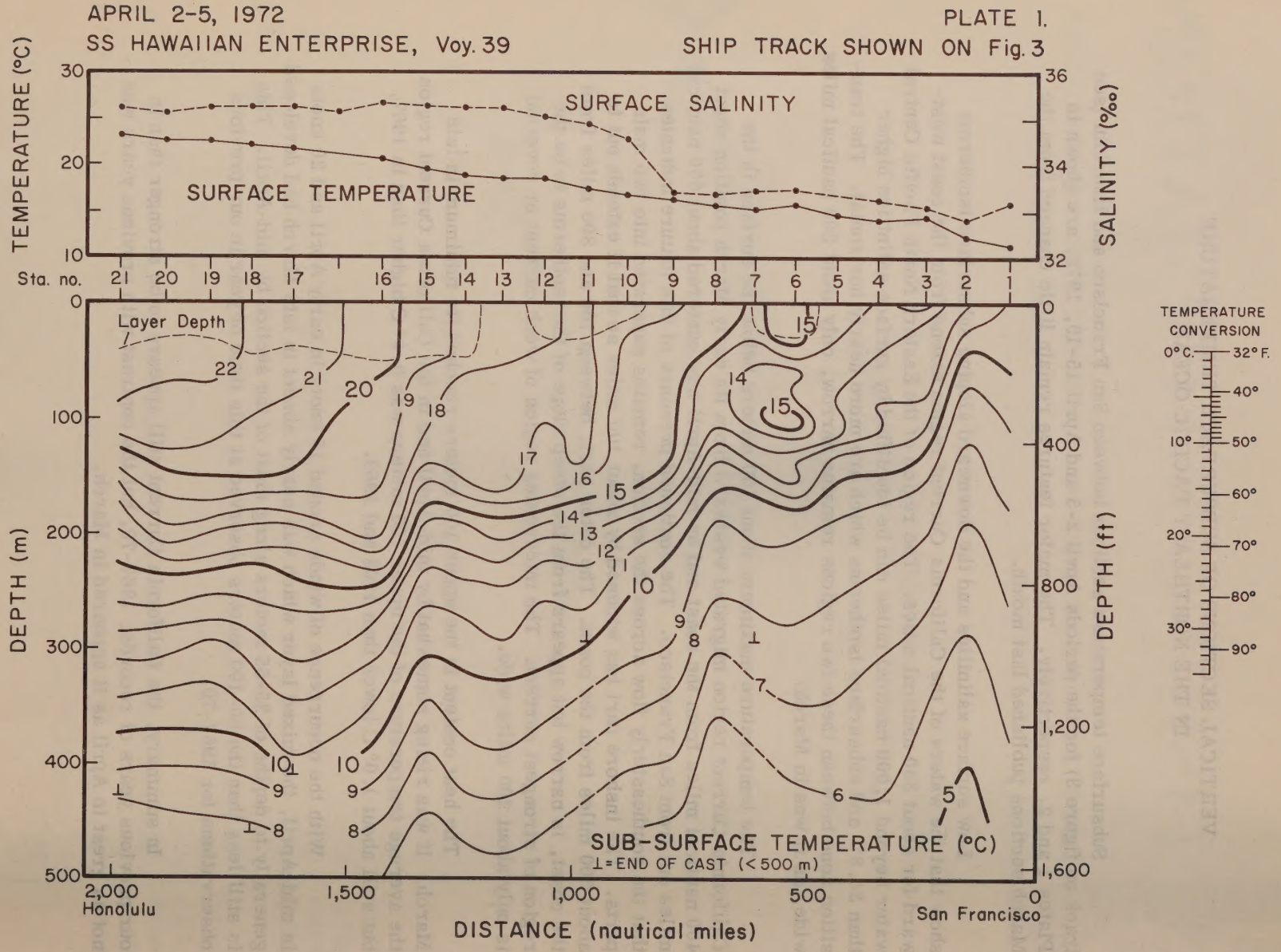
Low surface salinities and the downward sloping subsurface isotherms show that the waters of the California Current region extend from the coast westward for about 800 nautical miles. The region of the Eastern North Pacific Central water beyond 1,000 nautical miles can be identified by surface salinities higher than 34.8‰ and subsurface isotherms which are more nearly horizontal. The transition zone between these two regions remains narrow, only about 200 nautical miles wide, as it was in March.

The temperature maximum about 100 meters below the surface in the California Current region migrated westward from its early March position about 400 nautical miles from the coast and by mid-April was centered about 600 nautical miles out from San Francisco. The continued presence of this feature indicates that the southeasterly flow across the section, remains separated into two main parts. The inshore part has widened by about 100 miles so that it extends out to about 500 miles from the coast. The outer part, between 700 and 800 miles from the coast, is narrow but appears from the steep slope of the isotherms to be the region of strongest current. The intervening region of weak current or reversal is only about 200 miles wide.

The heat content in the upper 100 meters reached its minimum in late March. It was rising somewhat by mid-April and in the California Current region the average temperature of the upper 100 meters was 0.4° C higher than in 1967, but still about 1.0° C lower than 1968 and 1969.

With the occurrence of winds around 15 knots in early April and 20 knots in mid-April, the mixed layer which was nearly absent in late March had developed generally to depths of 35-55 meters along most of the section by mid-April. This is still less than the 80-100 meters observed at this time of year in our previous observations for 1967-70.

In summary, the California Current still appears to be stronger than in our previous years of records, 1967-70, but the contrast with previous years was not as great in April as it appeared in March.


APRIL 2-5, 1972
SS HAWAIIAN ENTERPRISE, Voy. 39
PLATE 1.
SHIP TRACK SHOWN ON Fig. 3
TEMPERATURE (°C)
SALINITY (‰)
SURFACE SALINITY
SURFACE TEMPERATURE
Sta. no.
21 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1
Layer Depth
DEPTH (m)
DEPTH (ft)
SUB-SURFACE TEMPERATURE (°C)
⊥=END OF CAST (< 500 m)
DISTANCE (nautical miles)
2,000
Honolulu
1,500
1,000
500
0
San Francisco
TEMPERATURE CONVERSION
0° C.
32° F.
10°
20°
30°
40°
50°
60°
70°
80°
90°

NARRATIVE DESCRIPTION OF OCEAN TEMPERATURE CONDITIONS
APRIL 1972

Northeastern Pacific

A large pool of warmer-than-normal water in the central portion of the eastern North Pacific diminished further this month as temperatures edged closer to normal. The change is most evident north-northeast of Hawaii, between latitudes 30° N and 50° N, where the area enclosed by the line representing deviations of 2° F is considerably smaller than in the previous month (Figure 5).

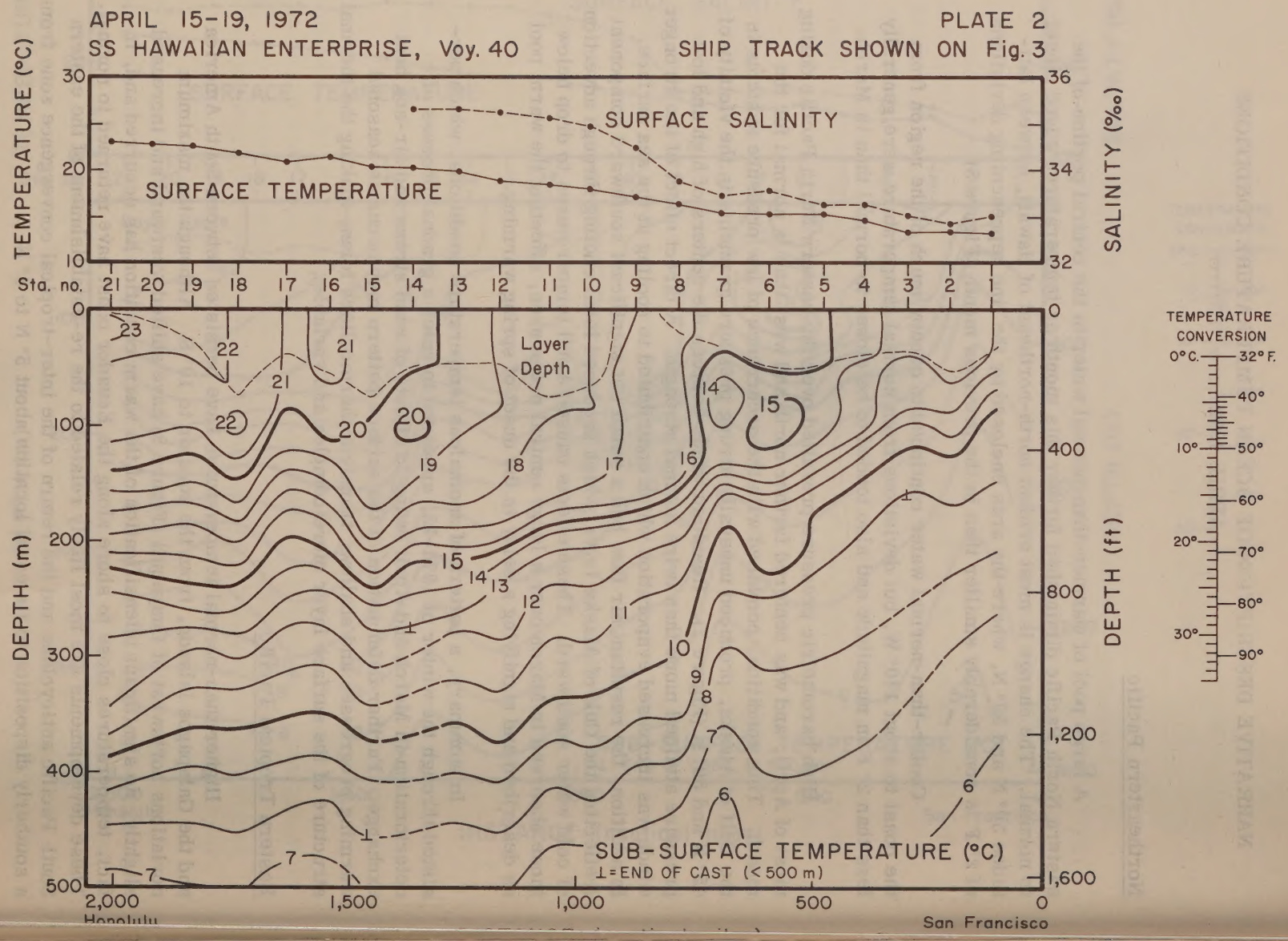
Cooler-than-normal water continued to occupy much of the region from the coast to about 140° W, but deviations from normal temperature were generally less than 2° F in magnitude and also tended to be closer to normal than in March.

High barometric pressure prevailed over the eastern North Pacific during most of April, and was centered farther north and west than is normal for the month. This condition, combined with the occurrence of low pressure systems in the Gulf of Alaska, produced unusually strong pressure gradients in the vicinity of 45° N and 50° N (Figure 2). Resultant winds between the centers of high and low pressure attained more than twice normal strength. A direct effect of the stronger winds was increased evaporation which contributed to cooling at the sea surface. In addition, the resultant air flow had a small but significant southward component (reflecting the Gulf of Alaska Lows) which produced local cooling through advection of cold water southward. These effects caused April temperatures to drop below those observed in March over a large central ocean area, affecting the warm pool as described and signifying a delay in the onset of spring warming.

In summary, a pattern of anomalous temperature conditions, which persisted through the winter of 1971-72, appeared to enter a gradual process of deterioration in March and April owing to effects of wind stress and air-sea heat exchange. Further deformation of the surface pattern may occur as seasonal warming progresses and shallow, transient thermoclines form, making the thermal structure of the surface layer more complex and variable.

Eastern Tropical Pacific

Higher-than-normal temperatures have persisted between South America and the Galapagos Islands, from the equator to 10° S. Although the maximum deviations northwest of Guayaquil (Figure 8) have shifted westward and increased slightly, no significant intensification of the warm condition has occurred and, in fact, temperatures close to shore along the Ecuador coast have returned to normal. These developments are most likely related to the re-establishment of the eastern South Pacific anticyclone and the return of the inter-tropical convergence zone from a southerly disposition to its usual location about 5° N to 8° N.


APRIL 15-19, 1972
SS HAWAIIAN ENTERPRISE, Voy. 40
PLATE 2
SHIP TRACK SHOWN ON Fig. 3
TEMPERATURE (°C)
SALINITY (‰)
SURFACE SALINITY
SURFACE TEMPERATURE
Sta. no.
DEPTH (m)
DEPTH (ft)
Layer Depth
SUB-SURFACE TEMPERATURE (°C)
⊥=END OF CAST (< 500 m)
Honolulu
San Francisco
TEMPERATURE CONVERSION
0° C.
32° F.

Waters off Central America warmed faster-than-normal, particularly from Acapulco to San Jose and in the Gulf of Panama. A tendency toward positive departures from normal also prevailed westward from the Revillagigedo Islands, between 10° N and 20° N, except in a limited area southeast of Hawaii. These conditions were associated with light winds and less-than-normal cloudiness.

Staff, Fishery-Oceanography Investigations
R. Michael Laurs, Leader

SEA SURFACE TEMPERATURE CHARTS, PACIFIC OCEAN

APRIL 1972

Acknowledgements

The following organizations and stations contributed data for April charts:

General Dynamics Convair Division; Ocean Data Buoy DANA
Hopkins Marine Station, Pacific Grove, California, J. P. Balesteri
Kelco Company, San Diego, California
Living Marine Resources Inc., San Diego, California
National Oceanic and Atmospheric Administration
National Marine Fisheries Service, La Jolla, California; Honolulu, Hawaii; Seattle, Washington
National Weather Service, San Diego, California
National Ocean Survey, Pacific Marine Center, Seattle, Washington
Pacific Environment Institute, Fisheries Research Board of Canada West Vancouver, British Columbia, by H. J. Hollister from observations by S. G. Westhaver at Langara Island Light; J. Godin at Cape St. James Light; L. Collins at Kains Island Lightstation; O. A. Edwards at Amphitrite Point Light
Scripps Institution of Oceanography, La Jolla, California, by Margaret Robinson
U.S. Naval Weather Service, Fleet Numerical Weather Central, Monterey, California
Fishing vessels Antonia C., Conquest, Carol S., Eastern Pacific, Elizabeth C.J., Elsinore, Frances Anne, Kathleen, Larry Roe, Lou Jean II, Marco Polo, Mariette, Mary Barbara, Mermaid, Polaris, Queen Mary, San Juan, Santa Rosa, Voyager

The cooperation of Matson Navigation Company and assistance of the Mates of the S.S. Hawaiian Enterprise in obtaining the expendable bathythermograph observations for the vertical temperature sections is acknowledged.

Charts

Figure 1.--Twelve-year mean (1961-1972) observed sea level values of barometric pressure (millibars), resultant wind direction (degrees true), resultant wind speed (knots) and average wind speed (knots) regardless of direction.

Figure 2.--Observed sea level values of barometric pressure (millibars), resultant wind direction (degrees true), resultant wind speed (knots), and average wind speed (knots) regardless of direction.

Figure 3.--Mean sea surface temperature, eastern North Pacific Ocean. Squares show temperatures at weather ship stations. Numerals on shore are temperatures at coastal and lightship stations.

Figure 4.--Mean sea surface temperature chart, western North Pacific Ocean.

Figure 5.--Deviation of sea surface temperatures, eastern North Pacific Ocean from long-term charts of H. O. 225. Hatched areas are colder in 1972.

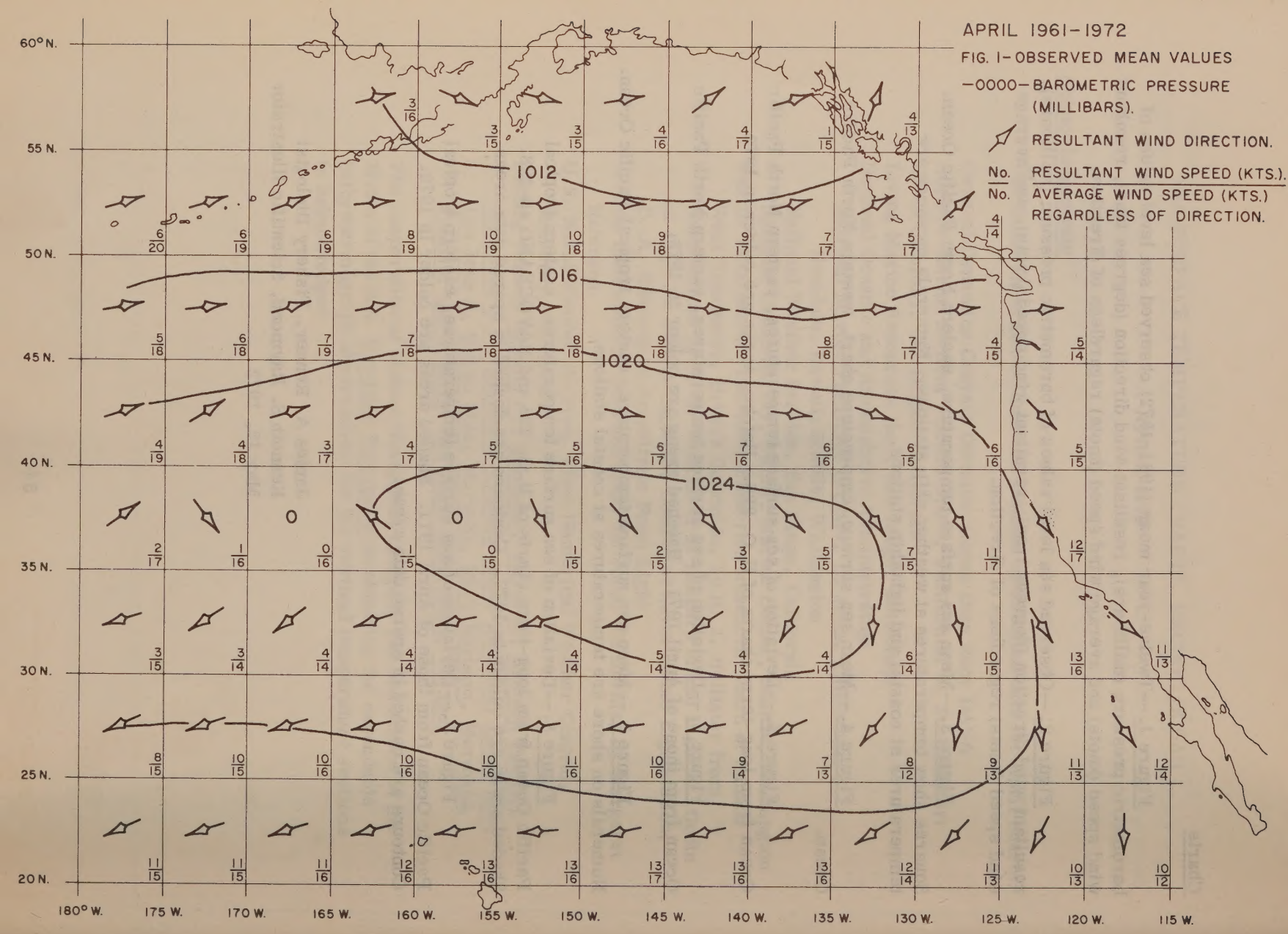
Figure 6.--Deviation of sea surface temperatures, eastern North Pacific Ocean from those of April 1971. Hatched areas are colder in 1972.

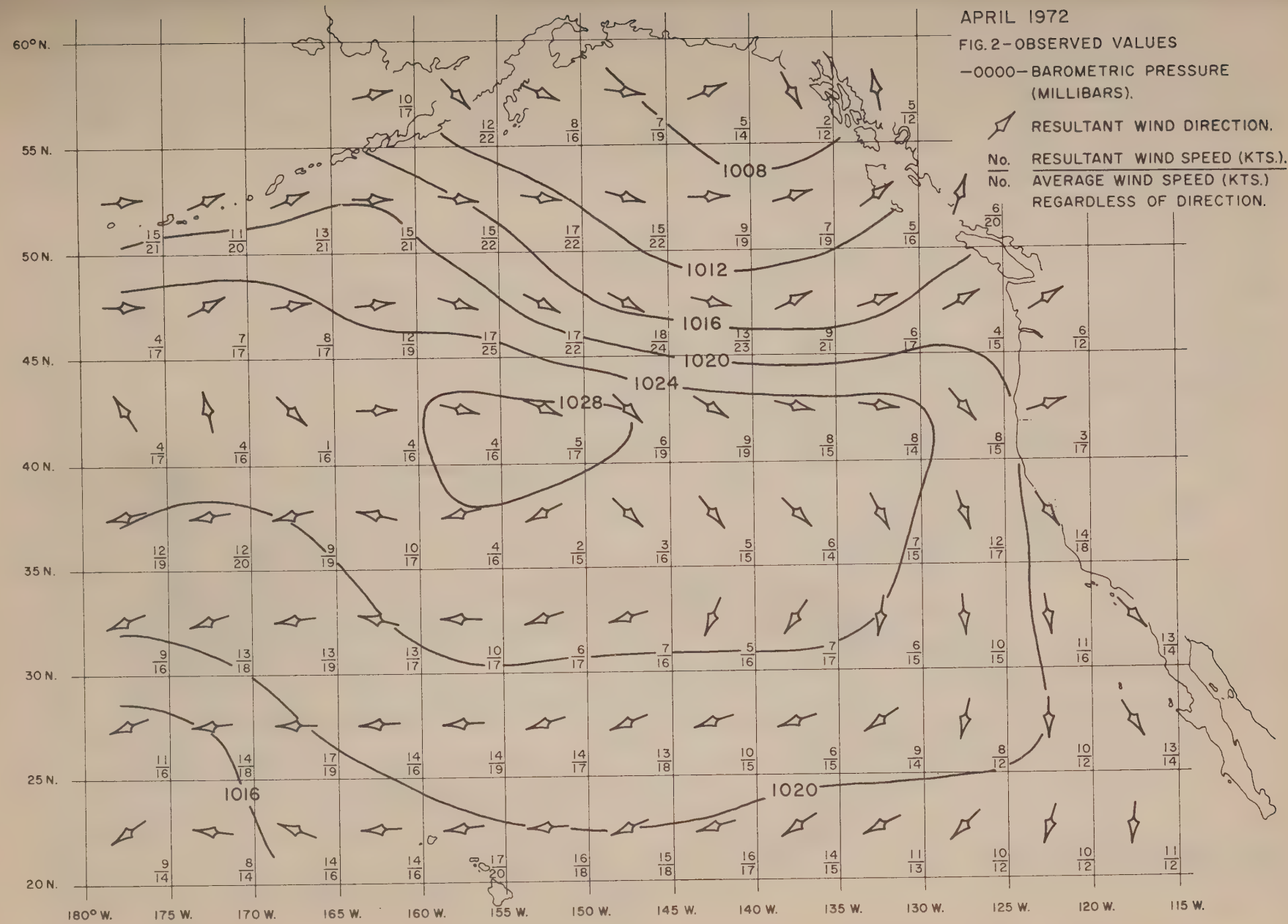
Figure 7.--Mean sea surface temperature, eastern tropical Pacific Ocean. Numerals on shore are temperatures at coastal stations.

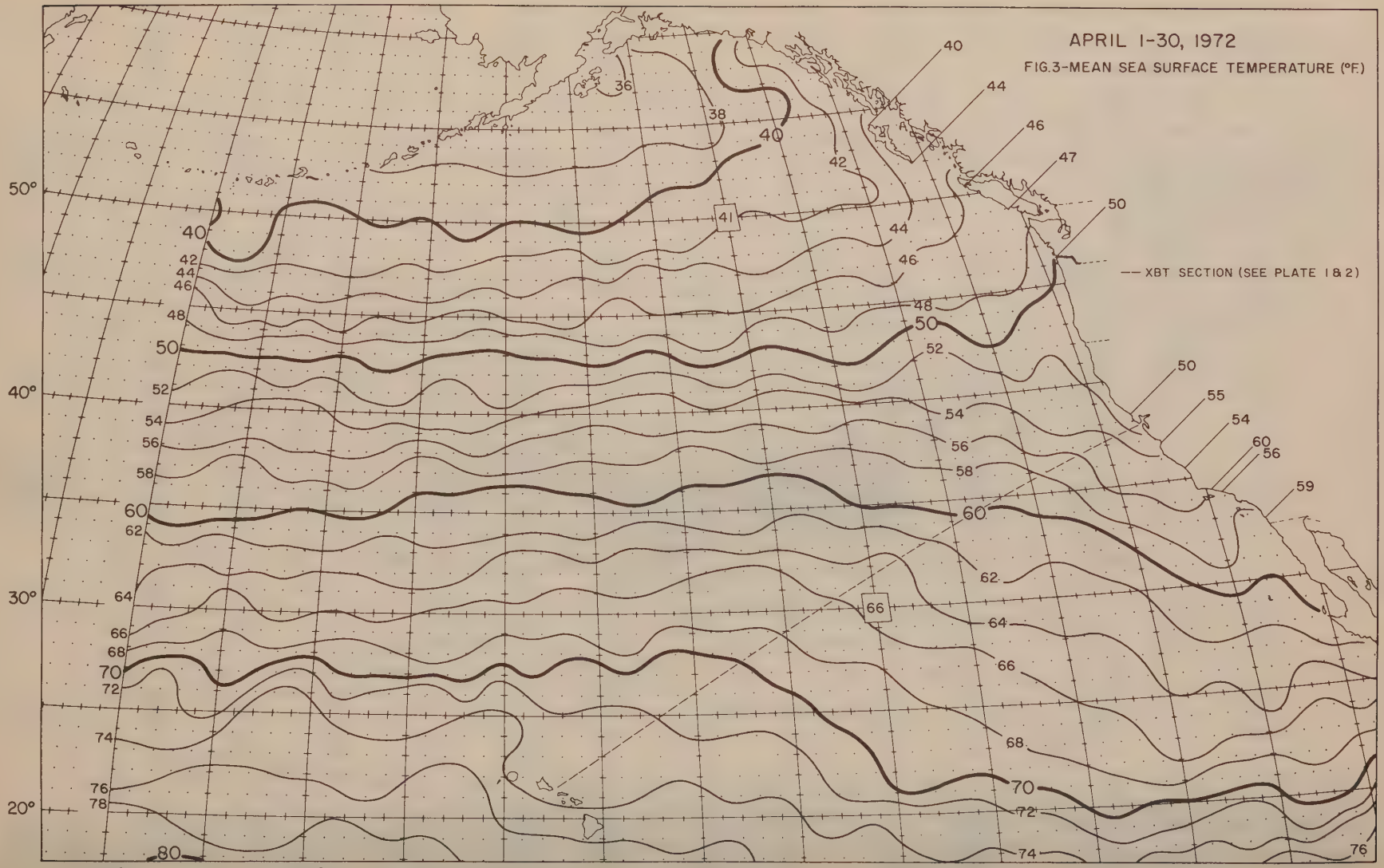
Figure 8.--Deviation of sea surface temperatures, eastern tropical Pacific Ocean from long-term charts of H. O. 225 and NAVOCEANO sp-123. Shaded areas are colder in 1972. Contours are dashed in sparse data areas.

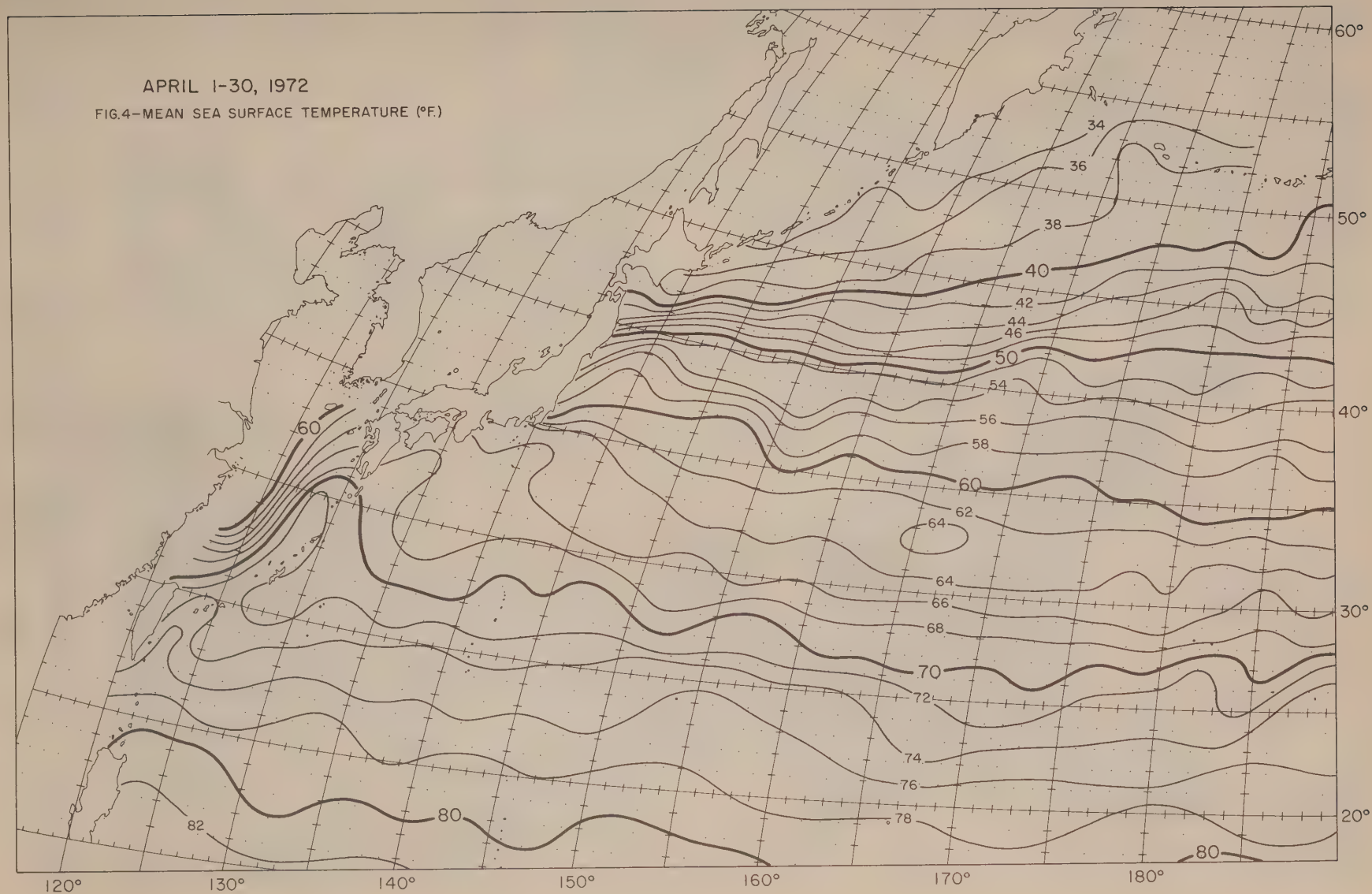
Figure 9.--Deviation of sea surface temperatures, eastern tropical Pacific Ocean from those of April 1971. Shaded areas are colder in 1972. Contours are dashed in sparse data areas.

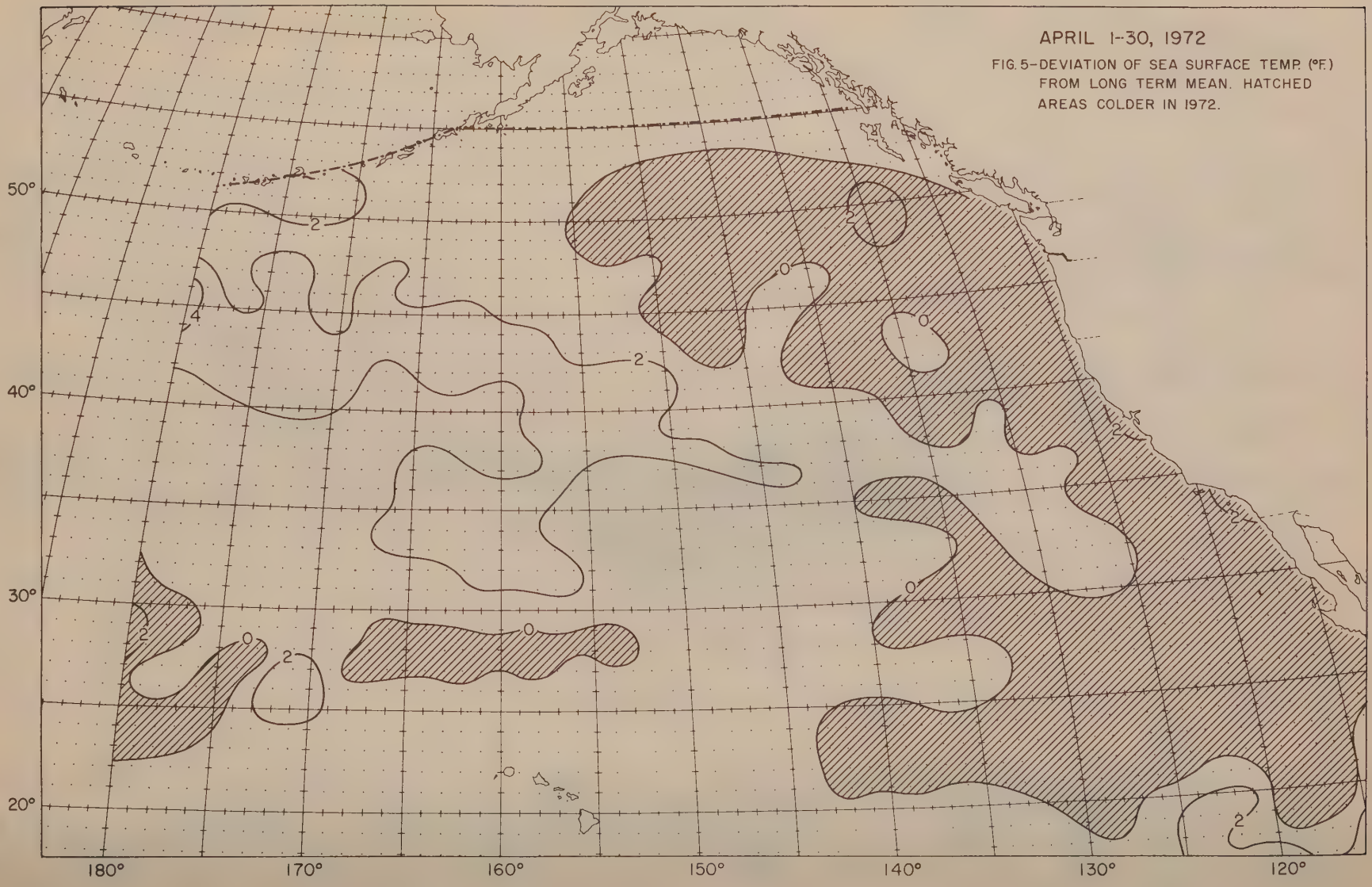
James A. Renner, Fishery Biologist
Kenneth S. Raymond, Scientific Illustrator
May 12, 1972

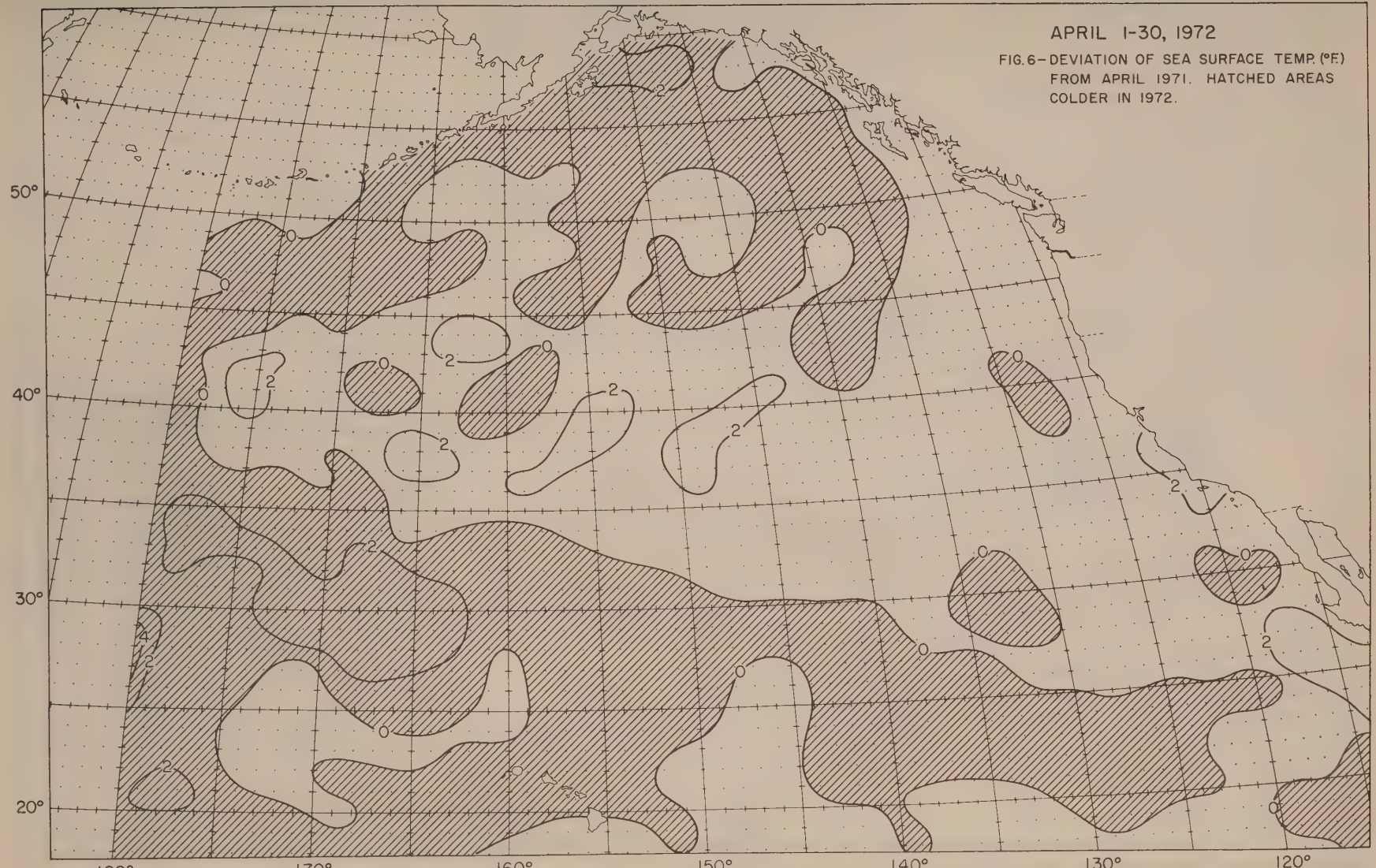

APRIL 1961-1972
FIG. 1-OBSERVED MEAN VALUES
-0000- BAROMETRIC PRESSURE (MILLIBARS).
RESULTANT WIND DIRECTION.
No. RESULTANT WIND SPEED (KTS.).
No. AVERAGE WIND SPEED (KTS.) REGARDLESS OF DIRECTION.
1012
1016
1020
1024
60° N.
55 N.
50 N.
45 N.
40 N.
35 N.
30 N.
25 N.
20 N.
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W.

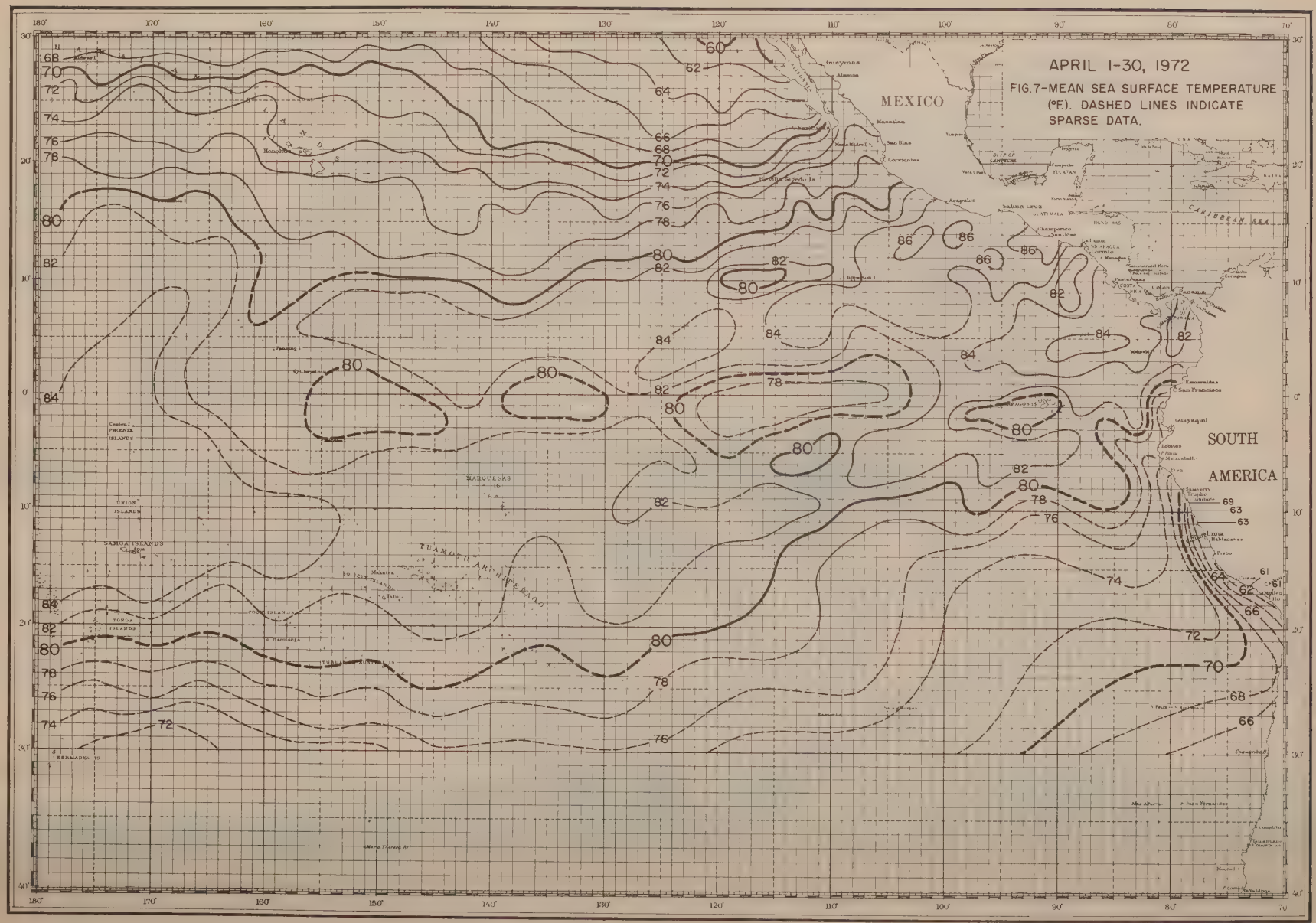

APRIL 1972
FIG. 2 - OBSERVED VALUES
—0000— BAROMETRIC PRESSURE (MILLIBARS).
RESULTANT WIND DIRECTION.
No. RESULTANT WIND SPEED (KTS.).
No. AVERAGE WIND SPEED (KTS.) REGARDLESS OF DIRECTION.
1008
1012
1016
1020
1024
1028
1016
1020
60° N.
55 N.
50 N.
45 N.
40 N.
35 N.
30 N.
25 N.
20 N.
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W.

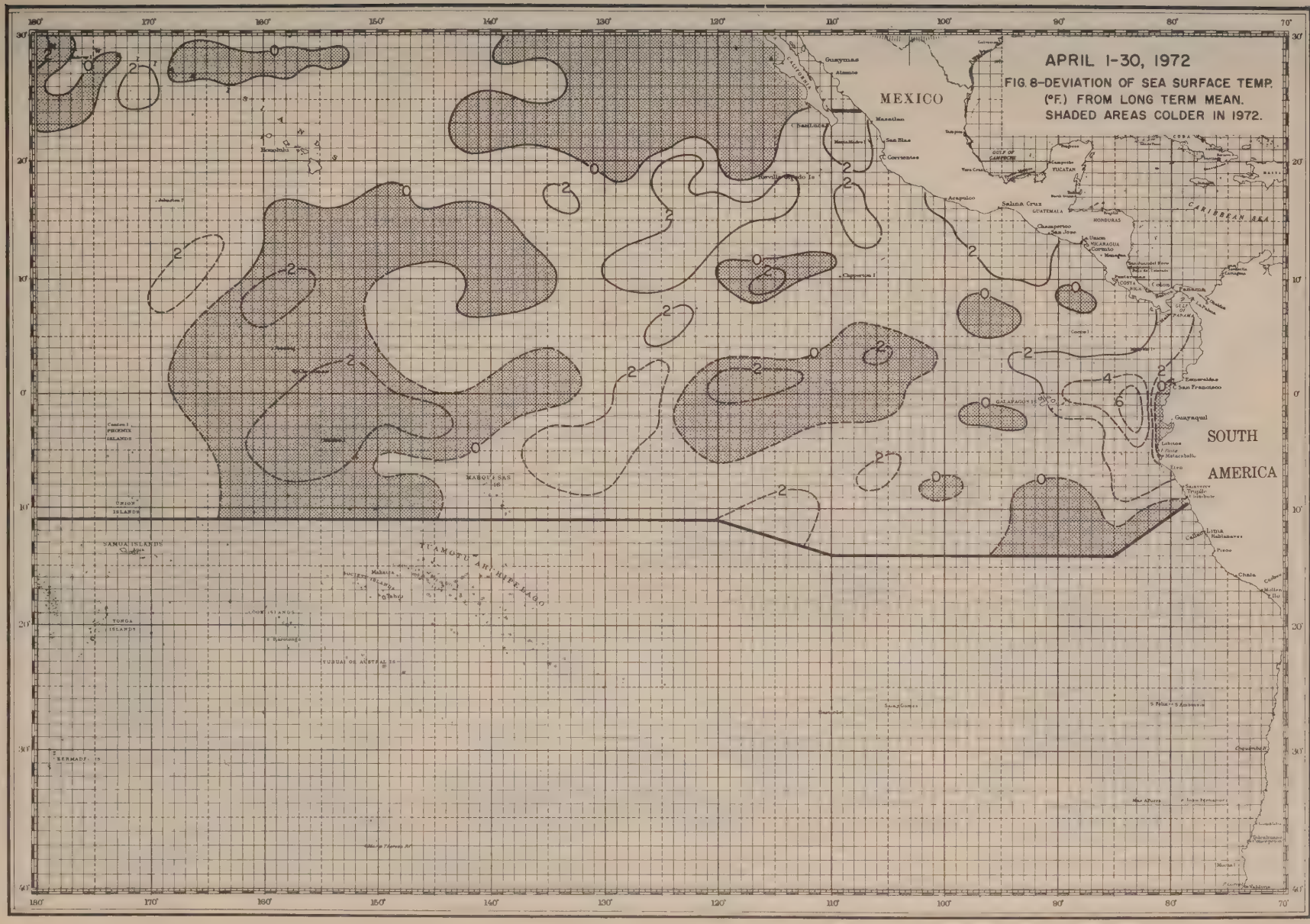

APRIL 1-30, 1972
FIG.3-MEAN SEA SURFACE TEMPERATURE (°F.)
— XBT SECTION (SEE PLATE 1 & 2)
50°
40°
30°
20°
180°
170°
160°
150°
140°
130°
120°

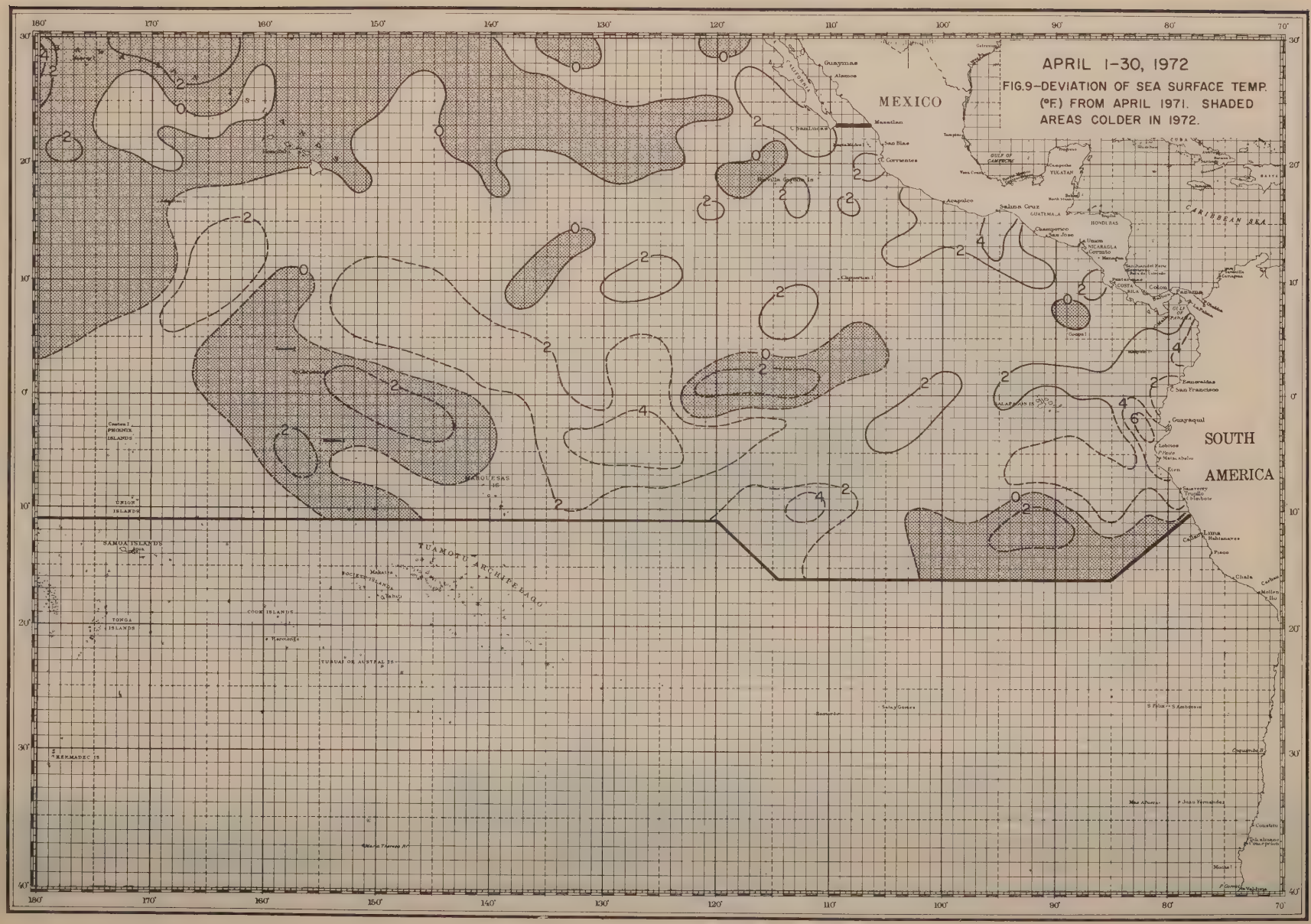

APRIL 1-30, 1972
FIG.4-MEAN SEA SURFACE TEMPERATURE (°F.)
34
36
38
40
42
44
46
50
54
56
58
60
62
64
64
66
68
70
72
74
76
78
80
82
60
80
60°
50°
40°
30°
20°
120°
130°
140°
150°
160°
170°
180°


APRIL 1-30, 1972
FIG. 5-DEVIATION OF SEA SURFACE TEMP. (°F.) FROM LONG TERM MEAN. HATCHED AREAS COLDER IN 1972.
50°
40°
30°
20°
180°
170°
160°
150°
140°
130°
120°
2
4
0

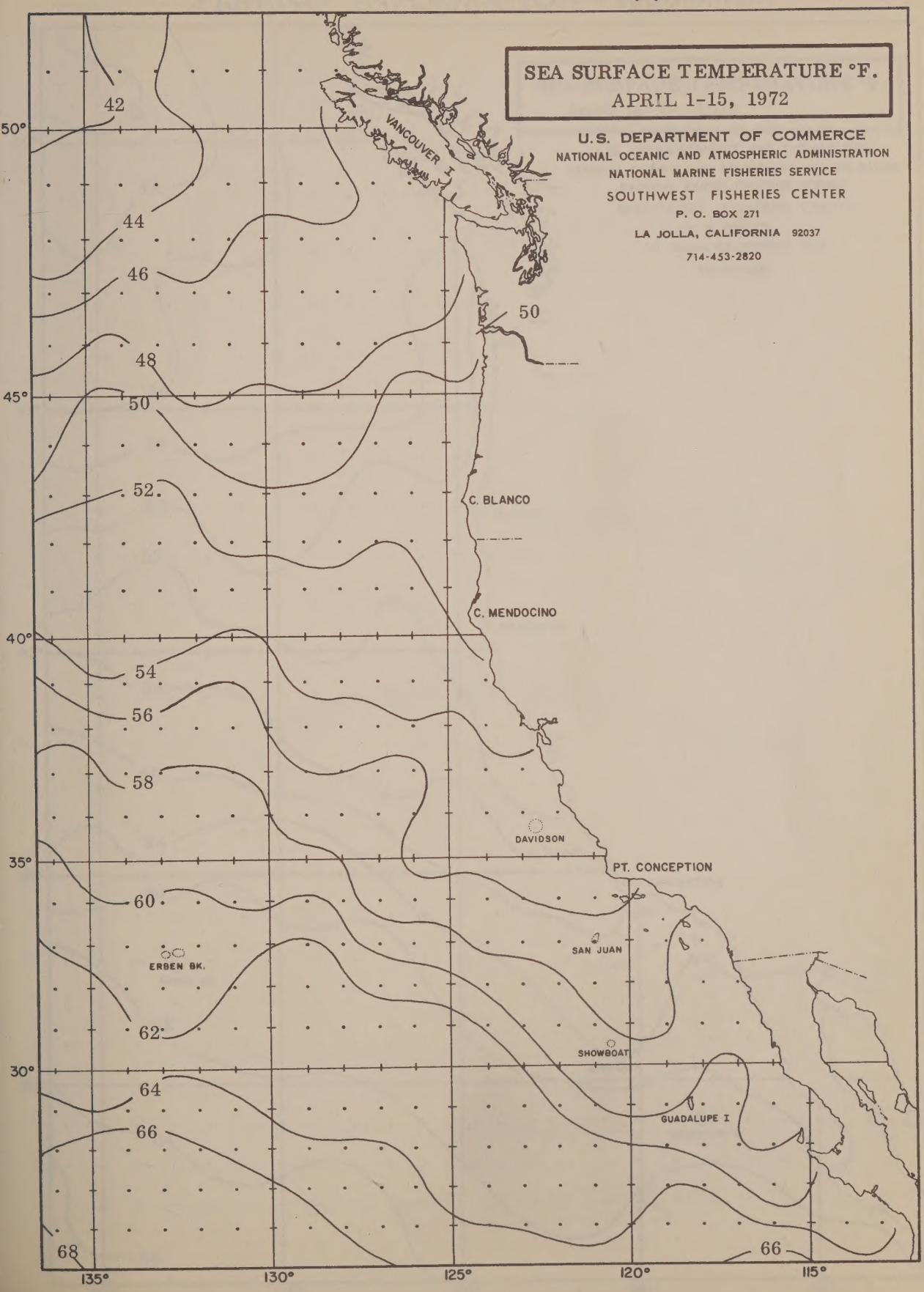

APRIL 1-30, 1972
FIG. 6 – DEVIATION OF SEA SURFACE TEMP. (°F.) FROM APRIL 1971. HATCHED AREAS COLDER IN 1972.
50°
40°
30°
20°
180°
170°
160°
150°
140°
130°
120°


APRIL 1-30, 1972
FIG.7-MEAN SEA SURFACE TEMPERATURE (°F). DASHED LINES INDICATE SPARSE DATA.
MEXICO
SOUTH AMERICA
CARIBBEAN SEA
HAWAIIAN ISLANDS
PHOENIX ISLANDS
SAMOA ISLANDS
TUAMOTU ARCHIPELAGO
MARQUESAS
TONGA ISLANDS
BERMUDAS
Acapulco
Guayaquil
Callao
Tahiti
Honolulu


APRIL 1-30, 1972
FIG. 8-DEVIATION OF SEA SURFACE TEMP. (°F.) FROM LONG TERM MEAN.
SHADED AREAS COLDER IN 1972.
MEXICO
SOUTH AMERICA
CARIBBEAN AREA
GUATEMALA
HONDURAS
NICARAGUA
COSTA RICA
PANAMA
GULF OF PANAMA
GULF OF CAMPECHE
YUCATAN
Guaymas
Mazatlan
San Blas
Corrientes
Acapulco
Salina Cruz
Champerico
San Jose
Corinto
Balboa
Cristobal
Colon
Guayaquil
Callao
Lima
Pisco
Chala
Arica
Iquique
Antofagasta
Valparaiso
GALAPAGOS IS.
CLIPPERTON I.
REVILLAGIGEDO IS.
SOCORRO I.
CEDROS I.
GUADALUPE I.
CORDOVA BANK
MAGDALENA BAY
CARMEN I.
SANTA ROSALIA
SAN JOSE I.
SAN FRANCISCO
SAN MARTIN I.
CLARION I.
SOCORRO I.
ROCA PARTIDA
CONTRERAS I.
PHOENIX ISLANDS
UNION ISLANDS
SAMOA ISLANDS
TONGA ISLANDS
TUAMOTU ARCHIPELAGO
TUBUAI OR AUSTRAL IS.
MARQUESAS
PUCKETT ISLANDS
Makatea
Tahiti
COOK ISLANDS
Rarotonga
BERMADES
Honolulu
Johnston I.
Palmyra I.
Christmas I.
Canton I.
Enderbury I.
Nassau I.
Funafuti
Nukufetau
Nanumea
Nanumanga
Niutao
Nukulaelae
Vaitupu
Nukufetau
Funafuti


APRIL 1-30, 1972
FIG.9-DEVIATION OF SEA SURFACE TEMP. (°F.) FROM APRIL 1971. SHADED AREAS COLDER IN 1972.
MEXICO
SOUTH AMERICA
CARIBBEAN SEA
GUATEMALA
HONDURAS
NICARAGUA
COSTA RICA
GULF OF PANAMA
GULF OF CAMPECHE
YUCATAN
Guaymas
Mazatlan
San Blas
Acapulco
Salina Cruz
Guayaquil
Lima
Callao
Paita
Pisco
Chala
Islas Galapagos
MARQUESAS IS.
SAMOA ISLANDS
TUAMOTU ARCHIPELAGO
COOK ISLANDS
TONGA ISLANDS
TUBUAI OR AUSTRAL IS.
PHOENIX ISLANDS
UNION ISLANDS
EASTER I.
JUAN FERNANDEZ
180°
170°
160°
150°
140°
130°
120°
110°
100°
90°
80°
70°
30°
20°
10°
0°
10°
20°
30°
40°

FISHING INFORMATION – supplement



FISHING INFORMATION – supplement